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**RELATIONSHIP BETWEEN EFFORTS TO PROTECT THE STRATOSPHERIC
OZONE LAYER AND EFFORTS TO SAFEGUARD THE GLOBAL CLIMATE
SYSTEM: ISSUES RELATED TO HYDROFLUOROCARBONS AND
PERFLUOROCARBONS**

Synthesis of information submitted by Parties and organizations

Note by the secretariat

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I. INTRODUCTION

A. Mandate

1. The Subsidiary Body for Scientific and Technological Advice (SBSTA), at its fifteenth session, recalled decision 17/CP.5 entitled "Relationship between efforts to protect the stratospheric ozone layer and efforts to safeguard the global climate system" (FCCC/CP/1999/6/Add.1).
2. The SBSTA further noted the information contained in document FCCC/SBSTA/1999/MISC.6 and Add.1 and 2 and also on the UNFCCC web site, and encouraged Parties included in Annex I to the Convention (Annex I Parties), the relevant bodies of the Montreal Protocol, the Intergovernmental Panel on Climate Change (IPCC), intergovernmental organizations and non-governmental organizations to update further the information on available and potential ways and means of limiting emissions of hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs), including their use as replacements for ozone-depleting substances.¹
3. The SBSTA also invited Parties to provide their views, by 1 March 2002, on information aspects noted in decision 17/CP.5 for compilation into a miscellaneous document (now available in FCCC/SBSTA/2002/MISC.6).
4. The SBSTA requested the secretariat to prepare a document for consideration by the SBSTA at its sixteenth session, drawing upon information received by 1 March 2002 (FCCC/SBSTA/2001/8, para. 56).

B. Scope of the note

5. This document was prepared in accordance with the mandate contained in paragraph 4 above. It is composed as follows: section C below suggests possible action to be taken by the SBSTA; section C. II provides a short overview of the past discussion of the SBSTA and the Conference of the Parties (COP) on the issue; section C. III: synthesis of options for consideration by the SBSTA; section C. IV: overview of new submissions by Parties and non-governmental organizations; and section C.V: overview of the policies and measures specifically targeted at emissions of HFCs, PFCs and SF₆ as reported by Annex I Parties in their third national communications.² This note is linked to other items on the SBSTA agenda, namely "Good practices in policies and measures", "Cooperation with relevant organizations", "Development and transfer of technologies", "Article 6 of the Convention: education, training and public awareness" and "Review of the financial mechanism".

C. Possible action by the SBSTA

6. The SBSTA may wish to take note of the information provided in this document and in document FCCC/SBSTA/2002/MISC.6 and provide additional guidance on this matter.

II. OVERVIEW OF THE PAST DISCUSSION

7. By its decision 13/CP.4, "Relationship between efforts to protect the stratospheric ozone layer and efforts to safeguard the global climate system: issues related to hydrofluorocarbons and perfluorocarbons", the COP initiated a discussion on the matter in November 1998.
8. The decision invited Parties, the relevant bodies of the Montreal Protocol, the IPCC, intergovernmental organizations and non-governmental organizations to provide information to the

¹ All submissions are available at <http://www.unfccc.int/program/wam/index.html>.

² For inventories of emissions of HFCs, PFCs and SF₆ for Annex I Parties see document FCCC/SBI/2001/13, tables 13, 14a, 14b and 15.

secretariat by 15 July 1999 on available and potential ways and means of limiting emissions of HFCs and PFCs, including their use as replacements for ozone-depleting substances. It also encouraged the convening of a workshop by the IPCC and the Technology and Economic Assessment Panel of the Montreal Protocol (TEAP) in 1999 which would assist the SBSTA to establish information on available and potential ways and means of limiting emissions of HFCs and PFCs, and invited the IPCC to report on the results of such a joint workshop to the SBSTA at its eleventh session, if possible. It further requested the secretariat to compile the information provided, including, if available, the conclusions of the workshop, for consideration by the SBSTA at its eleventh session. It requested the SBSTA to report on this information to the COP at its fifth session, and to seek further guidance from the COP on this matter at that session.

9. In response to that decision several activities were launched:

(a) In November 1998, the Parties to the Montreal Protocol adopted decision X/16, in which the TEAP was requested to provide such information to the UNFCCC, to assess the implications for the Montreal Protocol of the inclusion of HFCs and PFCs in the Kyoto Protocol, and to report these findings at its eleventh meeting (November 1999). In addition, the Parties to the Montreal Protocol also encouraged the IPCC and the TEAP to jointly convene a workshop on "available and potential ways and means" of limiting emissions of HFCs and PFCs;

(b) Following the request by the Parties to the UNFCCC and the Montreal Protocol, the technical support unit of the IPCC working group III and the TEAP co-organized the "Joint IPCC/TEAP expert meeting on options for the limitation of emissions of HFCs and PFCs", which was held in Petten, the Netherlands from 26 to 28 May 1999. The proceedings of the meeting are available on the Internet;³

(c) The UNFCCC secretariat provided a web site and template for reporting information on available and potential ways and means of limiting emissions of HFCs and PFCs, including their use as replacements for ozone-depleting substances. The submissions were compiled in documents FCCC/SBSTA/1999/MISC.6 and Add.1 and 2 and were made available on the web site;⁴

(d) The TEAP created a taskforce on HFCs and PFCs to undertake the assessment requested by the Parties to the Montreal Protocol. It produced the report "The implications to the Montreal Protocol of the inclusion of HFCs and PFCs in the Kyoto Protocol" in October 1999.⁵

10. The SBSTA again considered the issue at its eleventh session in November 1999. During the discussions, several Parties proposed further work to evaluate the available information. Due to a disagreement over whether there was a need for further work and on the scope of such work, a general conclusion was reached that the SBSTA should consider information aspects of this issue at its first session following the sixth session of the Conference of the Parties (see FCCC/SBSTA/1999/14 and decision 17/CP.5).

11. The fifteenth session of the SBSTA in November 2001 was the first session after the sixth session of the COP, the COP having resumed its sixth session in Bonn in June 2001. At that session, the SBSTA invited Parties and organizations to provide further information on available and potential ways and means of limiting emissions of HFCs and PFCs. It also invited Parties to provide their views, by 1 March 2002, on information aspects noted in decision 17/CP.5 for compilation into a miscellaneous document; and requested the secretariat to prepare a document, for consideration by the SBSTA at its sixteenth session, and decided to consider the issue further at its sixteenth session (FCCC/SBSTA/2001/8, para. 56).

³ See <http://www.ecn.nl/library/reports/1999/rx99029.html>.

⁴ See <http://www.unfccc.int/program/wam/index.html>.

⁵ See http://www.teap.org/html/teap_reports.html.

III. SYNTHESIS OF OPTIONS FOR CONSIDERATION BY THE SBSTA

12. The following options were synthesized from the submissions by Parties. These options are summarized in order to facilitate consideration of this issue by Parties. For the complete texts, please refer to the original submissions by Parties as contained in FCCC/SBSTA/2002/MISC.6.

13. Collection and dissemination of information: In many submissions, the importance of information sharing was stressed. One Party called for the development of a "global tool box" containing information to assist policy development. Related activities could include:

(a) Collection of emissions data and reporting methodologies and the preparation of a web site for the dissemination of that information to enable Parties to improve their emission inventories. The UNFCCC secretariat could be requested to perform this activity if additional funds were made available;⁶

(b) Further collection of technology information and policies and measures implemented or planned by Parties aimed at reducing emissions or replacing of HFCs, PFCs and SF₆. A web site for the dissemination of that information could be prepared to enable Parties to improve their national policies. The UNFCCC secretariat could be requested to perform this activity if additional funds were made available;

(c) Encouragement to all Parties to enhance research and development related to technologies that reduce emissions of HFCs, PFCs and SF₆ and which are, at the same time, energy efficient, and to report on their activities;

(d) Compilation of policies and measures by Annex I Parties reported, inter alia, in their national communications. Section V of this document contains an initial list of policies and measures; further material will be included in the compilation and synthesis of national communications, and in a more detailed synthesis of policies and measures contained in national communications of Annex I Parties to be prepared by the secretariat before the seventeenth session of the SBSTA;

(e) Integrated and independent assessment of technologies, which would compare the feasibility and environmental impact of using fluorinated gases (F-gases) and their alternatives. Such an assessment would include direct emissions of these gases when being produced, used, recycled or destroyed, as well as the emissions associated with the energy consumed during the use of the products. A user guide or handbook on "best practices" for minimizing emissions of F-gases could be developed which would deal with both technologies and system design. The IPCC could be requested to undertake this activity in close collaboration with the TEAP.

14. Coordination between the Montreal Protocol and the Kyoto Protocol: Some Parties mentioned the need for enhanced coordination between the institutions of the Montreal Protocol and the Kyoto Protocol and the actions related to them. It was mentioned that in developing countries only one transition from CFCs to an alternative is funded by the Multilateral Fund of the Montreal Protocol (MLF). A second transition from an intermediate substance such as an HCFC or possibly an HFC to an alternative has to be financed by the countries themselves. It was also reported that in most projects funded under the MLF in the domestic and commercial refrigeration sector ozone-depleting substances (ODS) are being replaced by HFCs. Specific activities in this area could include:

⁶ The Greenhouse Gas Emission Estimation Consortium (<http://www.ggeec.org/>), sponsored by governments and industry, is undertaking a similar effort to package the good practice recommendations into a model or set of models that could then be made available to countries to facilitate their reporting.

(a) Requesting the United Nations Environment Programme (UNEP), the Global Environment Facility (GEF) and the MLF to enhance the coordination of their activities and encourage the joint funding and implementation of projects;

(b) Exploring the possibility of jointly financing MLF and Clean Development Mechanism (CDM) projects;

(c) Requesting the secretariats of the Montreal Protocol and the UNFCCC to enhance their coordination by, inter alia, regularly participating in each other's meetings;

(d) Examining the feasibility of establishing international voluntary and/or negotiated agreements with selected sectors and industries.

15. Analysis of the dependency of developing countries on HFCs: One developing country Party highlighted that large and medium size enterprises in developing countries are highly vulnerable to trade restrictions and unexpected price signals. Companies that converted to HFCs, funded by the Multilateral Fund, would not be able to react to shortage of HFCs in the short term. As a possible action, the future demand for HFCs by developing countries could be analysed and the possible impact of a limitation of these substances evaluated. The IPCC could be invited to undertake this activity in close collaboration with the TEAP. Alternatively, the secretariat could be requested to commission a study on the subject if supplementary funds were made available. All Parties could be encouraged to report on their experiences in phasing out ozone-depleting substances and the subsequent use of HFCs.

16. Awareness raising: Some Parties mentioned that sharing information about HFCs, PFCs and SF₆ could be of great value. Several types of activities could be envisaged:

(a) Policy makers: Workshops and side events amongst Parties and stakeholders at sessions under the UNFCCC or the Montreal Protocol, relevant intergovernmental and international conferences, if possible in collaboration with relevant NGOs;

(b) Technicians: Seminars on better practices in the handling of equipment containing HFCs.

17. Regular progress reports: The SBSTA could request the secretariat to provide regular progress reports on activities related to the relationship between efforts to protect the stratospheric ozone layer and efforts to safeguard the global climate system.

18. Possible consideration of specific elements under the agenda item "Good practices in policies and measures": Several Parties stressed the need for an exchange of information on efficient policies and measures related to HFCs, PFCs and SF₆. Under this agenda item, there is a general discussion on national policies and measures in all sectors which could be broadened to explicitly include policies related to HFCs, PFCs and SF₆, which would be given particular emphasis.

19. Possible consideration of specific elements under the agenda item "Development and transfer of technologies": Several Parties stressed the need for an exchange of information on technologies related to HFCs, PFCs and SF₆. This agenda item includes a discussion on a technology transfer clearing house and international information network. If such a clearing house were to be set up, its remit could be broadened to explicitly include technologies related to HFCs, PFCs and SF₆.⁷

20. Termination of the discussion on this item: Some Parties did not provide views on any future steps to be taken by the SBSTA. This could be interpreted as implying that no further action by the

⁷ The UNFCCC prototype technology information clearing house is available at <http://ttclear.unfccc.com/ttclear/Jsp>.

SBSTA would be necessary and consideration of this item could be terminated. In phasing out ozone-depleting substances and implementing policies and measures targeted at HFCs, PFCs and SF₆, countries could draw upon the information that is available.

IV. INFORMATION SUBMITTED

21. Several Parties, organizations and institutions have submitted their views on the information aspects of available and potential ways and means of limiting emissions of HFCs and PFCs for consideration by the SBSTA at its sixteenth session.

22. The following Parties have provided their views:

- (a) Australia
- (b) Colombia
- (c) Spain on behalf of the European Community and its member States, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia
- (d) Switzerland
- (e) United States of America

23. The following organizations have made submissions:⁸

- (a) Alliance for Responsible Atmospheric Policy
- (b) Climate Action Network Europe
- (c) European Federation of Asthma and Allergy Associations (EFA)
- (d) European Partnership for Energy and the Environment (EPEE)
- (e) International Aluminium Institute

24. The NGO submissions were mainly from industrial organizations. One environmental NGO (Climate Action Network) and one patient-related organization (European Federation of Asthma and Allergy Associations) submitted their views.

25. In total, the NGOs submitted approximately 300 pages in which the emphasis was on global and regional – mainly European – information. Both detailed sector-specific data, as well as aggregated information were provided. Many NGOs emphasized the mitigation activities they had either started or already implemented. Information on potential future activities was less readily available. The submissions included both technical information and options for management practices.

26. The submissions by Parties and organizations are outlined below. Please refer to the original submissions, as contained in document FCCC/SBSTA/2002/MISC.6, for the complete texts.

A. Australia

27. In its submission, Australia suggests the development of a global tool box of technical and policy information to assist policy development. It could include information on emissions data and reporting methodologies, as well as mitigation options, economic aspects and technological development.

⁸ Submissions from organizations that are not accredited observers to the UNFCCC are available on the web site of the secretariat (<http://www.unfccc.int/program/wam/index.html>).

Australia also suggests that the coordination of ozone protection and climate change could be increased by strengthening links between the institutions of the two processes.

28. An outline of Australia's strategies for managing synthetic greenhouse gas (GHG) emissions is also provided. The Government has developed a set of overarching policy principles which include responsible use, emission minimization and effective monitoring and reporting. On specific industry action, Australia is developing a comprehensive regulatory framework to manage emissions of both synthetic GHGs and ozone-depleting substances, which will include general requirements to avoid and minimize emissions as well as the establishment of a national registration and certification programme. Emissions data and reporting have improved as a result of, inter alia, an agreement with domestic industry that it will report data annually on synthetic GHGs.

B. Colombia

29. Colombia notes that most projects to phase out ozone-depleting substances in developing countries in the refrigeration sector are based on HFCs, and that enterprises are highly vulnerable to trade restrictions on those substances. Colombia calls for educational programmes on servicing equipment that contains HFCs, research on technologies, and the realization of a study on the demand for HFCs in developing countries, as well as the possible impact of limitation measures.

C. Spain on behalf of the European Community and its member States, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia

30. This submission provides a brief overview of the negotiation process in the past. After recalling the latest scientific findings, it lists four points for action:

- (a) Identification and updating of information, including an independent assessment of the available information and a handbook on good practices in minimizing emissions;
- (b) Update of information on action taken by Parties under both the Montreal Protocol and the Kyoto Protocol;
- (c) Promotion of coordinated action across the two above-mentioned Protocols, including coordination of international voluntary agreements, between the financial institutions and secretariats;
- (d) Raising awareness among Parties and stakeholders.

D. Switzerland

31. Switzerland outlines its policy on HFCs, PFCs and SF₆. National legislation is being revised to provide a single regulatory framework covering ozone-depleting substances and GHGs with a high global warming potential (GWP) and a long half-life in the air (including HFCs, PFCs and SF₆).

E. United States of America

32. In its submission, the United States of America outlines its regulatory and voluntary measures to limit HFC, PFC and SF₆ emissions. The USA aims to stabilize or reduce the relative share of 2 per cent for HFCs, PFCs and SF₆ in all GHG emissions. Through voluntary activities, the USA, in 2000, reduced its HFC, PFC and SF₆ emissions by 8 million metric tons of carbon equivalent (MMTCE) relative to a business as usual scenario, and expects to reduce emissions by more than 35 MMTCE in 2010 compared to business as usual.

33. Sector-specific activities include regulation in the following areas:

- (a) Recovery of refrigerants: For refrigeration and air conditioning systems, the USA requires recovery of cooling agents. A fine is imposed for violations;
- (b) Significant New Alternatives Policy (SNAP) programme: The use of ozone-depleting substances and GHGs was limited in specific applications. For example, self-chilling cans using HFC-134a and HFC-152a have been banned.

34. Voluntary partnerships have been created in the following sectors:

- (a) Aluminium industry: A partnership was formed in 1996. Their goal of an emission reduction of over 45 per cent from 1990 levels was reached in 2000;
- (b) HFC-23 emission reduction programme: This programme led to a reduction of 4.8 MMTCE in 2000 since 1990 relative to business as usual, through process optimization and thermal destruction;
- (c) SF₆ emission reduction partnership for the magnesium industry: With the partners concerned, emission reduction strategies were implemented, SF₆ capture and storage devices were tested and emission inventory methods were developed;
- (d) SF₆ emission reduction partnership for electric power systems: The USA has been instrumental in gathering worldwide data on production and sales of SF₆, as well as on SF₆ flows through the economy and the environment;
- (e) PFC emission reduction partnership for the semiconductor industry: This partnership, which was launched in 1996, has catalysed global action by semiconductor manufacturers to reduce emissions of PFCs.

35. Additional recent voluntary programmes include:

- (a) The replacement of CFC-12 by HFC-134a in mobile air conditioning;
- (b) A workshop on ozone-depleting substances and GHGs in the military;
- (c) Responsible use of HFCs in the HFC-producing and using industries;
- (d) Voluntary code of practice for HFC and PFC fire protection agents.

36. Additional activities include the promotion of life-cycle climate analysis, including the Life-Cycle Climate Performance (LCCP) and global communications and collaboration.

F. Alliance for Responsible Atmospheric Policy

37. The Alliance for Responsible Atmospheric Policy (ARAP) has submitted comments on HFC applications and HFC alternatives. It has attached the report "Global Comparative Analysis of HFC and Alternative Technologies for Refrigeration, Air Conditioning, Foam, Solvent, Aerosol Propellant, and Fire Protection Applications" prepared by Arthur D. Little Inc. (approximately 150 pages). The report outlines the international and national political decisions related to the use and phase-out of CFCs. Activities of both developed and developing countries are outlined with particular emphasis on the USA, Europe and Japan. The cost savings to society both in the USA and globally when using CFCs and HFCs were estimated. Detailed information is given on the use of HFCs and alternative technologies for domestic and commercial refrigeration, mobile and unitary air conditioning, chillers, foam insulation,

solvents, aerosols and fire protection. The report includes a comparison of available systems and their effect on emissions and costs. Overall emission projections are also given.

38. The Alliance for Responsible Atmospheric Policy is an industry coalition that was organized in 1980 to address the issue of stratospheric ozone depletion. It is presently composed of about 100 manufacturers and businesses which rely on CFCs, hydrochlorofluorocarbons (HCFCs) and HFCs.

G. Climate Action Network Europe

39. The submission by Climate Action Network Europe (33 pages) outlines common characteristics of climate and ozone policy and calls for the harmonization of GHG and ozone policies. The report includes an analysis of the MLF of the Montreal Protocol and its effect on developing countries' HFC emissions.

40. Both the technical and economic aspects of the barriers to the transition to systems without HFCs are discussed including, inter alia, criticism of the absence of consideration of the impact of global warming in the CFC/HCFC transition programmes of the Montreal Protocol. A detailed historical analysis is given of why more emphasis was placed on HFC refrigerant projects than on hydrocarbon projects in the MLF programme and why it also emphasized HCFCs as a replacement for CFCs in foam blowing.

41. The submission compares scenarios for the future development of HFC emissions and their projected increases until 2100. A large increase in GHG emissions from HFCs is forecast.

H. European Federation of Asthma and Allergy Associations

42. The European Federation of Asthma and Allergy Associations (EFA), located in Slenaken (the Netherlands), represents patient-based asthma and allergy associations in Europe. It has submitted a position paper (two pages) on the need for metered dose inhalers (MDIs) in which the following aspects are discussed:

- (a) The potential replacement of CFC- and HFC-containing MDIs by CFC- and HFC-free dry powder inhalers (DPIs);
- (b) The role of MDIs and DPIs in various countries;
- (c) The need for future activities in the development of CFC-free devices;
- (d) The involvement of patient associations in related activities.

I. European Partnership for Energy and the Environment⁹

43. The European Partnership for Energy and the Environment (EPEE), located in Brussels (Belgium), is a broad-based grouping of companies and national and European associations active in the European air conditioning, heat-pump and refrigeration industry. Their submission (two pages) refers to an attachment composed of four components:

- (a) The paper "Climate Change policy framework for refrigeration and air conditioning – a proposal by EPEE for action in the EU" (seven pages);

⁹ The European Partnership for Energy and the Environment has applied for status as an accredited observer to the sixteenth sessions of the subsidiary bodies. The application is pending.

- (b) The "EPEE policy statement", including the EPEE Responsible Use Principles (three pages);
 - (c) The EPEE brochure "HFCs, refrigeration and air conditioning: minimizing climate change, maximizing safety";¹⁰
 - (d) The Meeting Report of the Joint IPCC/TEAP Expert Meeting on "Options for the Limitation of Emissions of HFCs and PFCs" (51 pages).
44. EPEE proposes activities related to equipment and system components and field-installed systems, as well as service and maintenance, for:
- (a) The producers and distributors of refrigerants;
 - (b) The manufacturers and importers of equipment and field-installed systems;
 - (c) The users of refrigeration, air conditioning and heat pump systems.

J. International Aluminium Institute

45. The International Aluminium Institute (IAI), a global forum of aluminium producers located in London (United Kingdom), made a submission (two pages) outlining IAI activities on PFC emission reduction in the global primary aluminium industry. A draft report entitled "Perfluorocarbon emissions reduction programme 1990-2000" (20 pages) was attached, in which the IAI outlines detailed technology-based emissions estimations, benchmarking data and a global emissions overview. The IAI PFC Reduction Initiative includes promotion of good operating practices and measurement programmes, as well as seminars and workshops.

V. POLICIES AND MEASURES IN THIRD NATIONAL COMMUNICATIONS

46. This section draws on sixteen third national communications that were available as of 1 April 2002.¹¹
47. Not all Parties have submitted information on their policies and measures targeted specifically at HFCs, PFCs and SF₆. Austria, the European Community, France, the Netherlands, New Zealand, Poland, Sweden, Switzerland and the United Kingdom have reported related activities. These are outlined in detail in the following sections and summarized in table 2. In some cases, it was difficult to classify activities on the basis of the information submitted by Parties. Additional information would help in improving the classification of policies and measures in table 2. Please refer to the original national communications for the complete texts.

A. Austria

48. Emissions of HFCs, PFCs and SF₆ account for 2 per cent of Austria's total GHG emissions. Their share is expected to increase to between 3 and 4 per cent in 2010. HFC emissions showed a steady increase, PFC emissions a sharply decreasing trend while those from SF₆ have fluctuated. Without further regulation, it is expected that emissions will have grown by about 50 per cent by 2010, mainly as a result of the increasing use of HFCs as a substitute for ozone-depleting CFCs.

¹⁰ This brochure was only mentioned in the e-mail submission, but not attached to the e-mail. It is available at the web page of the secretariat at: <http://www.unfccc.int/program/wam/index.html>

¹¹ Austria, Canada, Czech Republic, European Community, Estonia, Finland, France, Latvia, Monaco, Netherlands, New Zealand, Poland, Slovak Republic, Sweden, Switzerland, United Kingdom of Great Britain and Northern Ireland.

49. Austria established the Kyoto Forum, comprising representatives of its states (Länder) and municipalities, to support and supervise the strategy for reaching the Kyoto target by 1999. A subgroup on F-gases has been established comprising experts from the Federation, the Länder and from interest groups.
50. Austria has implemented policies and measures to reduce emissions of F-gases in the following contexts:
- (a) Housing support schemes;
 - (b) Support schemes for energy-efficient construction and use of renewable energy;
 - (c) Phasing out of ozone-depleting substances under the Montreal Protocol.
51. Additionally, the following policies and measures are planned:
- (a) Further improvement of housing support schemes;
 - (b) Regulation of the phasing out of HFCs and SF₆;
 - (c) Public procurement and support measures for an early phasing out of products containing F-gases;
 - (d) Avoidance of leakage of F-gases.
52. Some housing support schemes for building new houses and renovating existing buildings deal with the HFC emissions. Some Länder have implemented initiatives for phasing out materials containing F-gases in the construction of houses. Vorarlberg will only provide supplementary support for energy efficient houses if no construction materials containing F-gases are used. In Lower Austria, applications for 'Eco-home' support schemes may only be made if the materials used do not contain CFCs or HFCs. For the future, a law is planned that will prohibit the use of F-gases in construction material (construction foams, insulation material, SF₆ in windows). An agreement between the Federation and the Länder on support schemes for housing stipulates that public support will only be given to applicants who refrain from using insulation and other materials containing F-gases. The expected overall annual reduction in F-gas emissions as a result of measures related to the housing support schemes (including energy efficiency) amounts to between 2 and 2.5 million t CO₂-eq. Those measures that have already been implemented or adopted account for a reduction of between 0.5 to 1 million t CO₂-eq. The effect of phasing out F-gases in insulation material was not quantified.
53. Public procurement guidelines are intended to lead to an early phasing out of F-gases, particularly in delivery (e.g., cooling equipment) and construction services. As a result of this contractual measure, it is expected that annual GHG emissions will be reduced by 0.1 million t CO₂-eq. A reduction of 0.05 million t CO₂-eq. has already been achieved.
54. Under the Federal Chemical Act, the Federal Ministry of the Environment has begun consultations on a draft regulation to reduce and phase out the use of HFCs and SF₆, respectively, in all relevant applications. The following applications are affected:
- (a) Insulation material (HFCs);
 - (b) Construction foams (HFCs);
 - (c) Refrigeration (HFCs);
 - (d) Stationary and mobile air conditioning (HFCs);

- (e) Fire-fighting systems;
 - (f) SF₆ in sound absorbing windows;
 - (g) SF₆ in tyres; and
 - (h) SF₆ in insulated switch gear installations and in the production of semiconductors.
55. It is estimated that this measure will reduce GHG emissions by 0.8 million t CO₂-eq.
56. A voluntary agreement is planned whose aim is to avoid leakage of HFCs, PFCs and SF₆, starting with fluorinated refrigerants in business cooling systems, by reducing demand for refrigerants per system, installing collection facilities for refrigerants and establishing recycling in the future. The effect of these measures is expected to reduce GHG emissions by 0.3 million t CO₂-eq. annually.
57. The policies and measures planned in relation to F-gases are expected to achieve an annual reduction in emissions of 1.2 million t CO₂ equivalents.

B. European Community

58. The European Community (EC) launched the European Climate Change Programme (ECCP) in June 2000. Its goal is to identify the most environmentally and cost effective measures and to develop those elements of the climate change strategy that are needed to implement the international agreements under the UNFCCC.
59. The European Community has identified the following sectors where policies and measures related to F-gases need to be implemented:
- (a) The transport sector;
 - (b) The industry sector;
 - (c) The waste sector; and
 - (d) The building sector.
60. For the transport sector, mobile air conditioning was identified as relevant in the context of emissions of F-gases. Emissions of HFCs in the air conditioning systems of cars are not yet included in the agreements with ACEA, the organization representing the interests of European car, truck and bus manufacturers. The ECCP has proposed that they should be included in this agreement. Non-CO₂ GHG emissions are considered to be a minor component of all GHG emissions from the transport sector; no reduction estimates for mobile air conditioning were given.
61. The industry sector shows an increase in CO₂-equivalent emissions related to F-gases from 47 million t CO₂-eq. in 1990 to 62 million t CO₂-eq. in 1999. Under the Integrated Pollution Prevention and Control (IPPC) Directive, it is intended that measures will be taken to prevent emissions of F-gases, in particular, through the application of the Best Available Techniques (BAT). Working Group 5 of the ECCP has agreed on a set of specific actions to be taken by regulators and the industry because of the potential growth in emissions.
62. The objective of the industry sector activities is to improve monitoring and verification, as well as containment, and introduce marketing and use restrictions. Specific policies include:
- (a) A framework directive for improved containment of F-gases;

- (b) Links to other Community legislation: IPPC, waste electrical and electronic equipment (WEEE), end-of-life vehicles;
- (c) Voluntary agreements;
- (d) Development of alternative fluids and not-in-kind technologies; and
- (e) Sector-specific recommendations.

63. These policies and measures are implemented through regulation and voluntary agreements by the European Community and its member States. The reduction estimates for industry related policies and measures at a cost below 20 €/t CO₂-eq. are 30 million t CO₂-eq. in 2010. Additionally, emissions can be reduced by 20 million t CO₂-eq. at a cost above 20 €/t.

64. Within the waste management sector, emissions of F-gases from refrigerator fluids and foams are relevant and are dealt with under the legislation on WEEE. For 'old' WEEE,¹² effective measures need to be taken to trap CFC emissions from refrigerator foam. For 'new' WEEE,¹³ it is argued that metal recycling from refrigerators shows a net GHG emissions benefit because the HFC releases are more than compensated by savings related to metal recycling. Landfilling of WEEE will be reduced in the future. The effect on GHG emissions was not quantified.

65. In the building sector, emissions of F-gases are mentioned as being related mainly to air conditioning. They make a small, though increasing, contribution to the overall GHG emissions from the building sector. No specific policies and measures were mentioned.

C. France

66. France intends to implement both existing and supplementary measures to reduce emissions of F-gases. The effect of these measures on total emissions is summarized in the following table:

Table 1. Projection of emissions of HFCs, PFCs and SF₆ for France, in million t CO₂-eq.

	1990	1999	2010	2020
Without measures	7.6	9.1	34.0	43.3
With existing measures	7.6	9.1	26	32.2
With additional measures	7.6	9.1	11.1	10

67. Existing measures in the industry sector place their emphasis on the role of voluntary agreements. Such agreements have been made with the aluminium, steel, lime, cement and glass industries. The total reduction in emissions (including both CO₂ and F-gases) amounts to 4.4 million t CO₂-eq. annually.

68. France has initiated its main policies and measures in the following areas:

- (a) PFCs in primary aluminium smelters;
- (b) SF₆ and PFCs in electronics manufacturing;
- (c) SF₆ in magnesium foundries;
- (d) SF₆ in electric switchgear; and
- (e) HFCs in refrigeration.

¹² Old WEEE contain CFCs as blowing agents in the foam.

¹³ New WEEE contain HFCs as blowing agents in the foam.

69. In consultation with the relevant industries, a regulation aimed at limiting PFC emissions per tonne of aluminium manufactured is under preparation. On a short term-basis, optimization measures are expected to achieve a 10 per cent reduction in specific emissions. In the medium term, research and development on inert anodes is needed to suppress emissions of CF_4 and C_2F_6 . Short-term activities are expected to achieve a reduction in emissions of 81 000 t CO_2 ; medium-term activities may manage a reduction of 855 000 t CO_2 .

70. In the electronics industry, a new regulation on the use of SF_6 and PFCs is being prepared which will replace the 1976 ordinance on the classification of installations for environmental reasons. The aim of the new regulation is to ensure that gases used in classified units are reclaimed and destroyed and that the emissions from these units are controlled. A voluntary agreement with electronics manufacturers has been established under the auspices of the World Semiconductor Council to reduce emissions of PFCs and SF_6 by 10 per cent during the period 1995 to 2010. Such activities are expected to reduce emissions by 1.38 million t CO_2 -eq.

71. In respect of magnesium foundries, the need to reduce SF_6 emissions and to replace the 1976 regulation is to be addressed in the following two ways:

- (a) To apply best practices and to reduce emissions of SF_6 in the short term; and
- (b) To increase the cost of SF_6 to reflect its GWP, and to replace SF_6 with alternatives, e.g., SO_2 , in the medium term. These measures would reduce SF_6 emissions by 1.365 million t CO_2 -eq.

72. A voluntary agreement is being discussed with electrical switchgear manufacturers, but, in the case of failure to reach a voluntary agreement, a regulation would then be envisaged. The aim of the agreement is to reduce emissions from leakage during manufacture, operation and decommissioning.

73. Policies and measures related to HFCs in refrigeration have already been implemented. Standards for tightness and for reclaiming refrigerants when decommissioning refrigeration installations containing more than 2 kg of refrigerant are defined in a decree dated 7 December 1992. A control scheme has recently been implemented to enforce the 1992 legislation. An extension of the inspections is planned in the future.

74. An inter-ministerial group is preparing policies and measures to increase the responsibilities of refrigeration installers and ensure that refrigerants are reclaimed. These cover:

- (a) The translation of the Community directive of 18 September 2000 into national law;
- (b) Extension of a Community directive on the reclaim of used electronic equipment also to used refrigeration equipment; and
- (c) Revision of the conventions governing the refrigeration trade to make reclamation of refrigerants more attractive.

75. As in the case of refrigeration, it is also planned to extend the 1992 legislation (tightness of applications and reclaiming F-gases) to mobile air conditioning. Control measures and sensitization of the public will also be included.

76. The following activities which are not directly related to a specific sector are also under way:

- (a) A qualification and accreditation scheme to restrict the sale of refrigerant solely to accredited refrigeration installers is under consideration; and
- (b) Following negotiations at Community level, a taxation scheme for F-gases on the basis of their environmental impact is under consideration.

D. Netherlands

77. The Government of the Netherlands is planning to reduce non-CO₂ GHGs by 8 million t CO₂-eq. annually in the period 2008–2012. Emissions of HFCs, PFCs and SF₆ account for 6 million t CO₂-eq., i.e., approximately 20 per cent of the overall reduction in GHGs and 75 per cent of the projected reduction in non-CO₂ GHGs. The annual cost of the reduction in non-CO₂ GHG emissions amounts to € 140 (65) million in national costs and € 220 (100) million in financial costs.

78. Between 1998 and 2008, some € 120 million will have been made available by the Dutch Government for the ROB Programme (non-CO₂ GHG reduction). These activities are further supported by the Accelerated Depreciation of Environmental Investment Scheme (VAMIL) and the Environment Investment Tax Reduction (MIA) list. It is estimated that € 75 million will have been devoted to implementing these activities between 2002 and 2008.

79. The ROB programme is aiming at a real reduction in GHG emissions, taking into account the TEWI. The reductions are fairly distributed across the economic sectors as part of a long-term implementation strategy whereby little pain and effort is experienced. It includes generic activities and 15 sector-oriented projects, partly with an allocation of reduction targets. The sector-oriented projects are in three phases: a research phase, a phase for estimating emissions and reduction options, and an implementation phase. Examples for projects in the second phase include the reduction of F-gases from fire extinguishing agents, the semiconductor industry, refrigeration, mobile and stationary air conditioning, cleaning agents and solvents; in the production of foams and aerosols; and from high-voltage switchgear and power current technology. Examples of projects in the implementation phase are the reduction of PFC emissions in the aluminium industry and of HFC process emissions.

80. Policies and measures from the basic package¹⁴ of the National Climate Policy Implementation Plan include:

- (a) Reduction of HFCs and PFCs as (H)CFC alternatives;
- (b) Reduction of PFCs from the aluminium industry;
- (c) Reduction of HFCs from process emissions; and
- (d) Reduction of SF₆ from the chip industry and heavy current technology.

81. In the reduction of HFCs and PFCs as (H)CFC alternatives various activities have already started. Research is in the study phase, regulations and agreements are in preparation, and subsidies and fiscal incentives are in effect. Emission reductions as a result of these activities are estimated at 4.0 million t CO₂-eq.

82. The reduction of PFC emissions in the aluminium industry is implemented through agreements and permits based on process adjustments (i.e., from side-worked to centre-worked prebake installations). This measure is in the implementation phase and a reduction in GHG emissions of 1.2 million t CO₂-eq. in 2010 is expected.

83. HFC process emissions can be reduced through installation and optimization of afterburners. Respective permits are in effect already. The estimated reduction in GHG emissions amounts to 2.5 million t CO₂-eq. by 2010.

¹⁴ The Dutch National Climate Policy Implementation Plan includes the basic package, which is intended to reach the reduction targets, a reserve package to be considered in the event of unfavourable developments, and an innovation package with a focus on far-reaching emission reductions after 2012.

84. The Netherlands has commissioned a study on the reduction potential for SF₆ in the semiconductor manufacturing industry and in heavy current technology. The expected emission reduction is as yet unknown.

E. New Zealand

85. New Zealand has developed policies and measures for reducing emissions of F-gases in the following two sectors:

- (a) HFCs in refrigeration; and
- (b) PFCs in primary aluminium production.

86. A training scheme has been developed in association with the Institute of Refrigeration, Heating and Air Conditioning Engineers (IRHACE) which aims to improve work practices:

- (a) By minimizing refrigerant emissions; and
- (b) By increasing awareness of the IRHACE Code of Practice in the use of fluorinated substances.

87. Aluminium smelters are also a focus of New Zealand's activities related to F-gases. In recent years, New Zealand has achieved a marked reduction of PFC emissions from its single aluminium smelter through improvements in carbon consumption, better emissions control systems and continuous improvements in cell stability. The Resource Management Act (RMA) ensures that emissions are monitored and minimized. Energy efficiency is considered a key driver for improvements in the smelting process. As a result, there has been an annual reduction of emissions from the aluminium industry of 0.057 Gg CO₂-eq.

F. Poland

88. Poland aims to reduce emissions of F-gases from refrigeration. The country intends to gradually eliminate R141b and to reduce the use of R22. The development of improved refrigeration systems should achieve a further 20 per cent reduction in GHGs from refrigeration and foaming agents. In a project implemented in 1999, R141b was replaced by cyclo-pentane as a polyurethane foam blowing agent.

89. Other activities concern the reduction of emissions of ozone-depleting F-gases covered by the Montreal Protocol, with the associated benefits for climate change.

G. Sweden

90. Sweden has set a national emissions target for HFCs, PFCs and other F-gases of no more than 2 per cent of its total 1990 CO₂ emissions..

91. Sweden has taken regulatory measures limiting HFC emissions. The 'Refrigerants Ordinance' of the Swedish Environmental Protection Agency (EPA) covers the use of HFCs in refrigeration and heat pump units. Emissions from refrigeration have also been reduced through the introduction of compulsory inspections of new refrigeration units containing HCFCs, HFCs or other refrigerants by accredited inspection bodies. Annual site inspections of existing refrigeration units are also compulsory. Operators of refrigeration equipment are also required to report the results of annual inspections, as well as refrigerant handling methods to the regulatory authority.

H. Switzerland

92. In Switzerland, a regulation has been adopted to meet the reduction objectives for HFCs, PFCs and SF₆. Additionally, voluntary agreements and institutional activities have been undertaken.
93. Switzerland has put in place several laws and ordinances related to F-gases:
- (a) Ordinance Relating to Environmentally Hazardous Substances (1986, revised 1995);
 - (b) Ordinance Relating to Spray Cans (1995);
 - (c) Ordinance on the Movement of Toxic Waste; and
 - (d) Ordinance on Air Pollution Control.
94. Under the Federal Law on the Protection of the Environment, Switzerland has put in place the "Ordinance Relating to Environmentally Hazardous Substances" (1986, revised 1995). This ordinance aims, *inter alia*, to avoid emissions of HFCs and PFCs in fire-fighting. In Annex 4.16, the supply and import of extinguishing agents made of gases with a half-life of more than five years and the supply and import of appliances or stationary equipment containing such agents has been forbidden since 1 January 1996.
95. The Swiss Ordinance relating to Spray Cans (26 June 1995) forbids the use of HFCs and PFCs in most spray cans. An exemption is the use of HFC152a as a propellant in spray cans containing cosmetics and household products.
96. According to Article 26 of the Ordinance relating to Environmentally Hazardous Substances, self-supervision is required for the marketing of environmentally hazardous substances (including HFCs, PFCs and SF₆) and products containing these substances. Importers or producers need to show that their handling methods are not a hazard to either the environment or indirectly to persons through the environment.
97. The Swiss Ordinance on the Movement of Toxic Waste classifies waste containing HFCs and PFCs as special waste. Only licensed companies are allowed to handle this type of waste in an environmentally sound manner and its movement is controlled.
98. The use of HFCs and PFCs as solvents is covered in Announcement 2 (1994) concerning the Ordinance relating to Environmentally Hazardous Substances and the Ordinance on Air Pollution Control. These ordinances require solvents containing HFCs and PFCs to meet the emission reduction requirements of the most stringently regulated class of solvents. Refraining from the use of these substances should be achieved on a voluntary basis, but if the desired effects are not achieved, the Swiss Agency for the Environment, Forests and Landscape is prepared to propose appropriate measures.
99. The manufacture and installation of windows containing SF₆ should be avoided. This is laid down in Communication No. 1 (2000) relating to the Noise Abatement Ordinance and the Ordinance on Environmentally Hazardous Substances.
100. Other activities with the potential to release F-gases not yet covered by the regulation are dealt with through a combination of voluntary agreements, technical requirements and the regulation of production, trade, use and emission reductions. These activities include refrigeration, foams, solvents, other uses of spray cans, production of semiconductors, light metal production and high voltage electricity supply equipment. Use of these substances should be limited to those purposes for which other substances or techniques are not suitable or are more harmful from an environmental point of view.

Strict emission reduction measures will be requested in the future. A voluntary agreement on emission limits for SF₆ in high voltage equipment will be developed in partnership with industry.

101. The effect of policies and measures related to the reduction of emissions of F-gases is not quantified specifically. It is expected that HFC emissions will increase from 530,000 t CO₂-eq. in 2000 to 930,000 t CO₂-eq. in 2005 and 970,000 t CO₂-eq. in 2010. Emission trends for PFCs were not available.

I. United Kingdom of Great Britain and Northern Ireland

102. For detailed information on policies and measures related to HFCs, PFCs and SF₆, the third national communication refers to the 'UK Climate Change Programme'. This has been used as a source of information for this report. The UK emphasizes the role of voluntary agreements in the mitigation of emissions of HFCs, PFCs and SF₆. In 1996, it concluded five voluntary agreements with the following business sectors:

- (a) Refrigeration and air conditioning;
- (b) Mobile air conditioning;
- (c) Foams;
- (d) Fire protection; and
- (e) Aerosols.

103. Strategies have been devised which minimize HFC emissions from these applications without hampering efforts to phase out ozone-depleting substances. Best practice guidelines have been developed and less emissive technologies have been applied.

104. In the electronics industry, the World Semiconductor Council and its European representative, the European Electronic Component Manufacturers Association (EECA), made a commitment to reduce their PFC emissions by 10 per cent between 1995 and 2010 through process optimization, alternative chemistry, and capture and recycling, as well as the abatement and destruction of PFCs.

105. No alternative to SF₆ in gas-insulated switchgear has yet been found. Here, the focus has been on reducing leakage during refurbishment and use.

Table 2. Summary of sector-specific activities and their status as reported by Parties in their third national communications or submissions

	Insulation, foam	Refrigeration	Stationary air conditioning	Mobile air conditioning	Cleaning agents, solvents	Aerosols, sprays	Chemical industry: process emissions	Fire-fighting systems	Aluminium smelters	Magnesium foundries	Windows	Tyres	Switchgear, high voltage	Semi-conductor industry	Wastes containing fluorinated gases
Greenhouse gases*	HFC	HFC	HFC	HFC	HFC	HFC	HFC	HFC, PFC	PFC	SF ₆	SF ₆	SF ₆	SF ₆	SF ₆ , PFC	HFC, PFC, SF ₆
Australia*	reg, rep p	reg, rep p	reg, rep p	reg, rep p	reg, rep p	reg, rep p		reg p							
Austria	reg/pr p/i	reg p	reg/va p	reg/va p				reg p			reg p	reg p	reg p	reg p	
European Community		p		va p											reg p
France		tr/inf/ec p/a/i		ed/reg/ec a		reg a			va/po/td p/i	reg p			va p	reg p	
Netherlands							per i	p	va/per/po a				p	p	
New Zealand	p	p tr/wp	p	p	p				po i						
Poland	pp i	res/td p/a													
Sweden		reg i													
Switzerland	va/sta/reg p	va/sta/reg p			va/sta/reg p/i	reg p/i		reg i			reg a		va p	va/sta/reg p	reg i
United Kingdom	va a	va a	va a	va a		va a		va a						va a	
United States of America*		reg/pen i	reg/pen i	va a			va/po p/i	va p	va i	va i			rep i	va i	

Type of measures: ec – economic, ed – education, inf – information, pen – penalties, per – permits, po – process optimization, pp – pilot project, pr – promotional, reg – regulatory, rep – reporting, res – research, sta – standards, td – technology development, tr – training, va – voluntary agreement, wp – work practice.

Status: p – planned, a – adopted, i – implemented.

* Australia and the United States of America did not submit their third national communication by 1 April 2001. Information for this overview was taken from the submissions contained in document FCCC/SBSTA/2002/MISC.6.